

CLAIMS

1. A line balance control method which targets at production line having a plurality of component mounting machines that mount components on a substrate and which controls line balance by allocating components to be mounted, to each component mounting machine, including

 a possibility inquiring step in which at least one of devices including the component mounting machines that configure the production line makes an inquiry of whether or not it is possible to mount components to be allocated, to component mounting machines which become allocation destinations;

 a possibility obtaining step in which the device obtains a response to the inquiry in the possibility inquiring step; and

 an allocating step in which the device or another device that configures the production line allocates components to be mounted, to each component mounting machine, in such a manner that mounting time at each component mounting machine is equalized, on the basis of the response obtained in the possibility obtaining step.

2. The line balance control method according to claim 1, wherein the possibility inquiring step is carried out by a device which does not require optimization of that device itself, among devices which are included in the production line.

3. The line balance control method according to claim 2, wherein the device, which does not require the simple body optimization, is any one of a printing machine and a reflow machine.

4. The line balance control method according to claim 1, further comprising:

a step of obtaining a load which is loaded to an arithmetic processing section that each device, which is included in the production line, has, through a communication line connected between the devices, wherein the possibility inquiring step is carried out by a device which has the largest room in processing ability of the arithmetic processing section.

5. The line balance control method according to claim 1, further comprising:

a step of obtaining a connecting position in the production line, wherein, in case that mounting of components by use of the plurality of component mounting machines is carried out in the order corresponding to component height, the possibility inquiring step is carried out by a component mounting machine which has been connected to uppermost stream.

6. The line balance control method according to claim 1, further comprising:

a step of obtaining a connecting position in the production

line, wherein, in case that mounting of components by use of the plurality of component mounting machines is carried out in the order corresponding to component height, the possibility inquiring step is carried out by a component mounting machine which has been connected to lowermost stream.

7. The line balance control method according to claim 1, further comprising:

a step of obtaining production time of each device which is included in the production line, through a communication line which was connected between the devices, wherein the possibility inquiring step is carried out by a component mounting machine in which the production line is the longest.

8. The line balance control method according to claim 1, further comprising:

a step of obtaining production time of each device which is included in the production line, through a communication line which was connected between the devices, wherein the possibility inquiring step is carried out by a component mounting machine in which the production line is the shortest.

9. An apparatus which carries out control of line balance intended for a production line including a plurality of component mounting machines and configures the production line, comprising:

a possibility inquiring section, which makes an inquiry of whether or not it is possible to mount components to be allocated, among the components to be mounted, to component mounting machines which become allocation destinations;

a possibility obtaining section, which obtains a response to the inquiry in the possibility inquiring section; and

an allocating section, which allocates components to be mounted, to each component mounting machine, in such a manner that mounting time at each component mounting machine is equalized, on the basis of the response obtained in the possibility obtaining section.

10. The apparatus according to claim 9, further comprising:
another device information obtaining section, which obtains at least one information of information of a load which is loaded to an arithmetic processing section, connecting position information, production time information, in another device which is included in the production line, through a communication line; and

an allocation control section, which decides whether the possibility inquiring section, the possibility obtaining section, and the allocating section are operated or not, on the basis of information of the obtained another device information and corresponding own device information.

11. A program which targets at production line having a

plurality of component mounting machines that mount components on a substrate, for controlling line balance by allocating components to be mounted, to each component mounting machine, the program having an arithmetic processing section of at least one of devices including the component mounting machines that configure the production line, executed

a process of making an inquiry of whether or not it is possible to mount components to be allocated, to component mounting machines which become allocation destinations, and

a process of obtaining a response to the inquiring process and,

having the device or another device that configures the production line, executed

a process of allocating components to be mounted, to each component mounting machine, in such a manner that mounting time at each component mounting machine is equalized, on the basis of the response obtained in the obtaining process.

12. The computer readable recording medium on which the program according to claim 11 is recorded.

13. A line balance control method which targets at a production line having a plurality of component mounting machines that mount components on a substrate, having

an actual production information obtaining step of obtaining actual production information regarding a state after actual production start from each component mounting machine;

a judging step of judging whether or not control of line balance is necessary or not on the basis of the actual production information of each component mounting machine; and

a line balance adjusting step of carrying out at least one processing among component allocation to each component mounting machine and a change of a mounting pattern on a substrate which each component mounting machine is in charge of, in case that it was judged that the control of line balance is necessary.

14. The line balance control method according to claim 13, wherein

the actual production information obtaining step includes a step of obtaining actual production time of each component mounting machine, as the actual production information.

15. The line balance control method according to claim 14, wherein the judging step judges that line balance control is necessary in case that there occurred a difference of a predetermined amount or more, between the actual production time and production time which was virtually obtained.

16. The line balance control method according to claim 14, wherein the judging step judges that line balance control is necessary in case that a difference of actual production time between respective component mounting machines is of a predetermined amount or more.

17. The line balance control method according to any one of claims 14 through 16, wherein

the line balance adjusting step further has, in case of carrying out component allocation of each component mounting machine;

a possibility inquiring step of making an inquiry of whether or not it is possible to mount components to be allocated;

a possibility obtaining step of obtaining a response to the inquiry in the possibility inquiring step; and

a step of allocating components to be mounted, to each component mounting machine, in such a manner that mounting time at each component mounting machine is equalized, by use of the obtained actual production time, on the basis of the response obtained in the possibility obtaining step.

18. The line balance control method according to any one of claims 14 through 16, wherein

the line balance adjusting step carries out allocation of the number of mounting patterns in accordance with a ratio of actual production time between the component mounting machines, in case of changing the mounting pattern which each component mounting machine is in charge of.

19. The line balance control method according to any one of claims 13 through 18, wherein

the actual production information obtaining step includes a step of obtaining a component supply state in each component mounting machine, as the actual production information.

20. The line balance control method according to claim 19, wherein the judging step judges that control of line balance is necessary in case that component shortage was detected, as the component supply state.

21. The line balance control method according to claim 20, wherein the line balance adjusting step allocates components of the component shortage, to a component mounting machine which is different from a component mounting machine in which the component shortage is detected.

22. The line balance control method according to any one of claims 13 through 21, wherein the actual production information obtaining step includes a step of obtaining production stoppage information in each component mounting machine, as the actual production information, and

the judging step judges that control of line balance is necessary, in case that there exists a component mounting machine which stopped production, and

the line balance adjusting step allocates components which the component mounting machine, which stops production, is mounting, to a component mounting machine other than the

component mounting machine which stopped production.

23. The line balance control method according to any one of claims 13 through 22, wherein

the actual production information obtaining step includes a step of obtaining information which shows frequency of errors due to at least one of absorption errors and mounting errors of components to be mounted in each component mounting machine, as the actual production information, and

the judging step judges that line balance adjustment is necessary in case that there exist components with the error frequency of a predetermined amount or more, and

the line balance adjusting step includes a step of allocating components with errors of the predetermined frequency or more, to another component mounting machine.

24. The line balance control method according to claim 1, further comprising:

a step in which a device, which allocated components to be mounted to each component mounting machine, specifies another device; and

a step of giving allocation data describing which component mounting machine components to be mounted, which are used in the allocating step, are allocated to, to the specified another device.

25. The line balance control method according to claim 1,
further comprising:

a step of giving allocation data describing which component
mounting machine components to be mounted, which are used in
the allocating step, are allocated to, to at least one another
device other than the device which allocated components to be
mounted, to each component mounting machine.